Studies on the Prevention of Tooth Decay

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FC

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Technical Reports Submitted as Follows:

#1 1 December 1952 to 30 June 1953.

#2 1 July 1953 to 31 December 1953.

#3 1 January 1954 to 31 December 1954.

#4 1 January 1955 to 31 December 1955.

Scientific Papers Published

Auskaps, A. M., and Shaw, J. H.: Vital Staining of Calcifying Bone and Dentin with Trypan Blue. J. Dent. Res., 34: 452, 1955.

Auskaps, A. M., and Shaw, J. H.: Hemoglobin Concentration, Thyroid Weight and Growth Rate in Rats during Minimum Fluoride Ingestion. J. Nutrition, 55: 611, 1955.

Shaw, J. H., and Sognnaes, R. F.: Developmental Factors in Experimental Animal Caries. In "Advances in Experimental Caries Research", edited by R. F. Sognnaes, American Association for the Advancement of Science, Washington, 1955, pg. 82.

Shaw, J. H.: Comparative Studies on the Caries-Susceptibility of Ten Strains of the Common Laboratory Rat. J. Dent. Res., 34: 727 (Abst. 147), 1955.

Summary

Representatives of ten strains of the common laboratory rat were maintained throughout successive reproductive cycles on a cariogenic purified diet (Shaw, J. H., J. Dent. Res., 26: 47, 1947). Six of these strains were obtained from the Wistar laboratories; one was obtained from the Holtzman breeding colony; the remaining three had been maintained in our laboratories for numerous generations. Their offspring were maintained on the same purified diet throughout their entire life span, including one or more reproductive cycles. Offspring in the second generation were tested for their caries-susceptibility by maintenance on three caries-producing diets: the above purified diet, the Hoppert-Webber-Canniff diet, and McClure's cooked cereal diet. These diets gave the same relative results for the caries-susceptibility of the strains, but uniformly the purified diet caused the greatest amount of tooth decay and the cooked cereal diet least, with the Hoppert-Webber-Canniff diet intermediate.

The strains with the highest caries-susceptibility were the Harvard susceptible and the Wistar mutant albino strains. The Wistar waltz-whirler, the Wistar chocolate and the Holtzman strains were moderately susceptible. The Wistar yellow red-eye, the Wistar yellow blue-eye, and the Wistar fawn were moderately resistant strains. The Long-Evans and Harvard resistant strains were the most caries-resistant of the ten strains. The most homogeneous results were obtained with the Harvard susceptible, the Harvard resistant and the Long-Evans strains which for several generations have been selected for particular characteristics of caries incidence. Within each remaining strain, there was a much higher degree of variability in dental caries experience.

Sufficient rats in each of the above strains completed caries-susceptibility trials to make the group size in each strain sufficiently large to give

a body of data that is suitable for statistical comparison. Altogether we have collected data from about 800 rats to be compiled and discussed in a manuscript to be submitted shortly to the Journal of Dental Research. These data include rates of growth and reproductivity, adult size, size of salivary glands and ratio of salivary gland weight to body weight.

Various chemical determinations of the components of the teeth have not indicated any correlation to caries-susceptibility. Furthermore all studies of bodily characteristics completed to date have not indicated any correlation to caries-susceptibility. Intensive studies are now underway to test the comparative enzyme levels in saliva from strains with divergent caries-susceptibilities. Particular emphasis is being placed on the protease activity of saliva under a variety of circumstances.

Future

These studies are being continued under a new contract Nonr-1866(01), which began 1 December 1955.